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REMARKS

The present response is intended to be fully responsive to all points of objection and/or rejection raised by the Examiner and is believed to place the application in condition for allowance. Favorable reconsideration and allowance of the application is respectfully requested.

Applicants assert that the present invention is new, non-obvious and useful. Prompt consideration and allowance of the claims is respectfully requested.

Status of Claims

Claims 1-21 and 23 have been rejected.

Claims 22 and 24 have been objected to.

Claims 1-6, 8-12, 14-15 and 17-24 remain pending in the application.

Claims 1-6, 8-12, 14-15 and 17-24 have been amended. Applicants respectfully assert that the amendments to the claims add no new matter.

Claims 7, 13 and 16 have been cancelled without prejudice or disclaimer. In making this cancellation without prejudice, Applicants reserve all rights in this claim to file divisional and/or continuation patent applications.

Remarks to the Drawings

The drawings were objected to as failing to comply with 37 C.F.R. 1.84 (p)(5).

A replacement sheet that includes an amended Fig. 6 is attached herewith. The amended Figure shows reference signs (60) and (61). Additionally, replacement sheets, each including amended Fig. 12 or 15, in which reference numbers (5) and (2) respectively were omitted, are attached herewith. Applicants request withdrawal of the objection.

35 U.S.C. § 112 Rejections

In the Office action, the Examiner rejected claim 5 under 35 U.S.C. § 112, second paragraph.

Claim 5 has been amended to overcome the deficiencies noted by the Examiner by replacing in the preamble the term "irradiation device" with "liquid disinfection device". Applicants respectfully assert that the amendment renders claim 5 proper under 35 U.S.C. § 112 and request that the rejection be withdrawn.

35 U.S.C. § 102 Rejections

In the Office action, the Examiner rejected claims 1-3, 6-10, 12-23, and 15-21 under 35 U.S.C. § 102(e), as being anticipated by McDonald et al. (US Pub. 2003/0155524, hereinafter "McDonald").

Independent Claim 1 was amended to include, *inter alia*, "a reflector to reflect light generated by said light source through said window into the flowing liquid within the pipeline, wherein the reflected light strikes the walls of the pipeline at angles of incidence greater than a critical angle for total internal reflection to enable total internal reflection".

Independent Claim 15 was amended to include, *inter alia*, "reflecting, with a reflector, said light radiation into said liquid flowing through the pipeline such that light is transmitted through the window into the liquid, and such that a major portion of said light strikes the walls of the pipeline at angles of incidence greater than a critical angle for total internal reflection to enable the total internal reflection".

The basis for these amendments is found at page 23, lines 3 to 6 of the application as filed.

Applicants respectfully assert that McDonald does not teach the above elements of amended claims 1 and 15.

McDonald discloses as follows:

"Reactor 1 comprises a radiation source which in this case is an ultraviolet lamp 2 which is formed as an annular sleeve to surround a sample vessel 3. Lamp 2, shown in section, is an elongated hollow cylinder which has an axially disposed hollow passage 20 at its centre into which vessel 3 fits, the arrangement being such that the longitudinal axes of the lamp 2 and vessel 3 are concentric. Thus lamp 2 is in effect an annular sleeve surrounding the vessel 3. Located axially radially outwardly of the lamp 2 is a reflector 4 which serves to reflect light emitted by the lamp 2 axially inwardly.

(Paragraph [0033], emphasis added).

Clearly, the structure disclosed by McDonald does not enable total internal reflection. The phenomenon of total internal reflection can occur only when light travels from a medium of higher refractive index to a medium having a lower refractive index. For example, total internal reflection will occur only when a light ray propagates from a transparent matter toward air if the light ray strikes or hits the medium boundary at an angle larger than the critical angle, but never when the light ray propagates from air to a transparent material having a higher refractive index. The critical angle for total internal

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reflection is given by $\arcsin (n_2/n_1)$ where n_2 is the lower refractive index of the less dense medium, i.e. air, and n_1 is the refractive index of the denser medium, i.e. glass. Accordingly, the structure disclosed by McDonald does not enable total internal reflection and the reflector disclosed by McDonald does not enable to reflect light generated by the light source for hitting walls of the reactors at angles of incidence greater than a critical angle for total internal reflection. Accordingly, Applicants respectfully assert that McDonald does not teach all the elements of amended claims 1 and 15. Applicants, therefore, assert that amended claims 1 and 15 are patentable and thus allowable over McDonald.

Claims 7 and 16 were cancelled without prejudice and therefore the rejection of these claims is now moot.

Each of dependent claims 2-3, 6, 8-10, 12-23, and 17-21 depends, directly or indirectly, from one of claim 1 and 15, and includes all the features of the claim from which it depends as well as additional distinguishing features, and is therefore allowable. Accordingly, Applicants respectfully request that the rejections under 35 U.S.C. §102(e) of claims 1-3, 6-10, 12-23, and 15-21 be withdrawn.

35 U.S.C. § 103 Rejections

In the Office action, the Examiner rejected claim 4 under 35 U.S.C. §103(a) as being unpatentable over McDonald in view of Foret (US 5,832,361).

Applicants respectfully traverse the rejection of claim 4 in view of the remarks that follow. Claim 4 depends from claim 1. McDonald was discussed above with respect to claim 1 and the discussion is equally applicable here. As discussed above with respect to the 35 U.S.C. §102(e) rejection, amended claim 1 is patentable over McDonald. Foret cannot cure the deficiencies of McDonald as it does not teach or suggest and the Examiner did not indicate that Foret teaches or discloses, at least "a reflector to reflect light generated by said light source through said window into the flowing liquid within the pipeline, wherein the reflected light strikes the walls of the pipeline at angles of incidence greater than a critical angle for total internal reflection to enable total internal reflection", as recited by amended claim 1.

Therefore, the combination of McDonald and Foret does not teach or suggest at least "a reflector to reflect light generated by said light source through said window into the flowing liquid within the pipeline, wherein the reflected light strikes the walls of the

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pipeline at angles of incidence greater than a critical angle for total internal reflection to enable total internal reflection", as recited by amended claim 1.

Accordingly, amended claim 1 is allowable over the combination of McDonald and Foret. Claim 4 includes all the features of claim 1 as well as additional distinguishing features, and is therefore likewise allowable over the combination of McDonald and Foret. Applicants respectfully request that the rejection under 35 U.S.C. §103(a) of dependent claim 4 be withdrawn.

In the Office action, the Examiner rejected claim 5 under 35 U.S.C. §103(a) as being unpatentable over McDonald in view of Hallett et al. (US 6,707,048, hereinafter "Hallett").

Applicants respectfully traverse the rejection of claim 5 in view of the remarks that follow. Claim 5 depends from claim 1. McDonald was discussed above with respect to claim 1 and the discussion is equally applicable here. As discussed above with respect to the 35 U.S.C. §102(e) rejection amended claim 1 is patentable over McDonald. Hallett cannot cure the deficiencies of McDonald as it does not teach or suggest and the Examiner did not indicate that Hallett teaches or discloses, at least "a reflector to reflect light generated by said light source through said window into the flowing liquid within the pipeline, wherein the reflected light strikes the walls of the pipeline at angles of incidence greater than a critical angle for total internal reflection to enable total internal reflection", as recited by amended claim 1.

Therefore, the combination of McDonald and Hallett does not teach or suggest at least "a reflector to reflect light generated by said light source through said window into the flowing liquid within the pipeline, wherein the reflected light strikes the walls of the pipeline at angles of incidence greater than a critical angle for total internal reflection to enable total internal reflection", as recited by amended claim 1.

Accordingly, amended claim 1 is allowable over the combination of McDonald and Hallett. Claim 5 includes all the features of claim 1 as well as additional distinguishing features, and is therefore likewise allowable over the combination of McDonald and Hallett. Applicants respectfully request that the rejection under 35 U.S.C. §103(a) of dependent claim 5 be withdrawn.

In the Office action, the Examiner rejected claim 11 under 35 U.S.C. §103(a) as being unpatentable over McDonald in view Saccomanno (WO 03/033413).

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Applicants respectfully traverse the rejection of claim 11 in view of the remarks that follow. Claim 11 depends from claim 1. McDonald was discussed above with respect to claim 1 and the discussion is equally applicable here. As discussed above with respect to the 35 U.S.C. §102(e) rejection amended claim 1 is patentable over McDonald. Saccomanno cannot cure the deficiencies of McDonald as it does not teach or suggest and the Examiner did not indicate that Saccomanno teaches or discloses, at least "a reflector to reflect light generated by said light source through said window into the flowing liquid within the pipeline, wherein the reflected light strikes the walls of the pipeline at angles of incidence greater than a critical angle for total internal reflection to enable total internal reflection", as recited by amended claim 1.

Therefore, the combination of McDonald and Saccomanno does not teach or suggest at least "a reflector to reflect light generated by said light source through said window into the flowing liquid within the pipeline, wherein the reflected light strikes the walls of the pipeline at angles of incidence greater than a critical angle for total internal reflection to enable total internal reflection", as recited by amended claim 1.

Accordingly, amended claim 1 is allowable over the combination of McDonald and Saccomanno. Claim 11 includes all the features of claim 1 as well as additional distinguishing features, and is therefore likewise allowable over the combination of McDonald and Saccomanno.

Applicants respectfully request that the rejection under 35 U.S.C. §103(a) of dependent claim 11 be withdrawn.

In the Office action, the Examiner rejected claim 14 under 35 U.S.C. §103(a) as being unpatentable over McDonald.

Applicants respectfully traverse the rejection of claim 14 in view of the remarks that follow. McDonald was discussed above with respect to claim 1 and the discussion is equally applicable here. As discussed above with respect to the 35 U.S.C. §102(e) rejection amended claim 1 is patentable over McDonald. Accordingly, claim 14 dependent from claim 1 is likewise allowable over McDonald.

Applicants respectfully request that the rejection under 35 U.S.C. §103(a) of dependent claim 14 be withdrawn.

In the Office action, the Examiner rejected claim 23 under 35 U.S.C. §103(a) as being unpatentable over McDonald in view of Chang (US 6,932,903).

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Applicants respectfully traverse the rejections of claim 23 in view of the remarks that follow. Claim 23 depends from claim 15. McDonald was discussed above with respect to claim 15 and the discussion is equally applicable here. As discussed above with respect to the 35 U.S.C. §102(e) rejection, amended claim 15 is patentable over McDonald. Chang cannot cure the deficiencies of McDonald as it does not teach or suggest and the Examiner did not indicate that Chang teaches or discloses, at least "reflecting, with a reflector, said light radiation into said liquid flowing through the pipeline such that light is transmitted through the window into the liquid, and such that a major portion of said light strikes the walls of the pipeline at angles of incidence greater than a critical angle for total internal reflection to enable the total internal reflection", as recited by amended claim 15.

Therefore, the combination of McDonald and Chang does not teach or suggest at least "reflecting, with a reflector, said light radiation into said liquid flowing through the pipeline such that light is transmitted through the window into the liquid, and such that a major portion of said light strikes the walls of the pipeline at angles of incidence greater than a critical angle for total internal reflection to enable the total internal reflection", as recited by amended claim 15.

Accordingly, amended claim 15 is allowable over the combination of McDonald and Chang. Claim 23 includes all the features of claim 15 as well as additional distinguishing features, and is therefore likewise allowable over the combination of McDonald and Chang.

Applicants respectfully request that the rejection under 35 U.S.C. §103(a) of dependent claim 23 be withdrawn.

Allowable Subject Matter

Applicants note that claims 22 and 24 contains allowable subject matter. Applicants assert that the amendments made to these claims should does not affect their patentability.

Conclusion

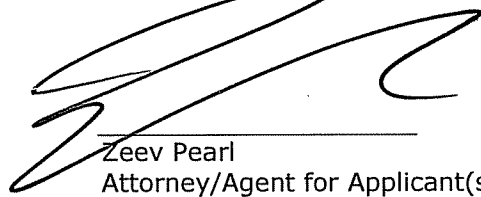
In view of the foregoing amendments and remarks, Applicants assert that the pending claims are allowable. Their favorable reconsideration and allowance is respectfully requested. Should the Examiner have any question or comment as to the

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form, content or entry of this Amendment, the Examiner is requested to contact the undersigned at the telephone number below.

Apart from the Extension fees, no fees are due, however, if any additional fee is due, the undersigned hereby authorizes the United States Patent and Trademark Office to charge the fees to Deposit Account 50-3355.

Respectfully submitted,



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